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ABSTRACT

This paper describes the characteristics of the Minimum Skills Diagnostic Tests (MSDTs) components of the statewide testing program in North Carolina. The MSDTs' validity, method for deriving test scores, reliability and other statistics, test content, and test norms are discussed. These tests--given in grades 3, 6, and 8--assess an individual's strengths and weaknesses (degree of mastery) in reading, language arts, and mathematics skills necessary for successful performance at the next grade level. The MSDTs form the second phase of a state program that begins with the California Achievement Tests. Those who perform at or below an established cut-off score on the MSDTs receive remedial instruction during a state-funded summer program. There are two forms (Forms A and B) of the MSDTs, each of which contains three subtests corresponding to the three subject areas. Each subtest consists of 99 items in objective sequence, with the exception of grade 3 mathematics, which has 104 items. After the summer program, students retake the MSDTs (Phase III of the state testing program) in long or short versions to show improvement in the mastery of standard objectives. Thirteen graphs give comparisons of Forms A and B. Nine tables present item difficulty by item number, and three additional tables give state norms. Three appendices show the item content and item representation by objective for the tests. (SLD)

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NC TESTS

Technical Characteristics of the

North Carolina Minimum Skills Diagnostic Tests

Forms A and B

North Carolina Department of Public Instruction
Division of Research/Raleigh, NC 27603-1332

Published 1988

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FOREWORD

NCDPI Division of Research, in cooperation with NCDPI Instructional Services, has developed diagnostic achievement tests of basic skills for public school students in Grades 3, 6, and 8; survey achievement tests of Science and Social Studies for students in Grades 3, 6, and 8; and end-of-course achievement tests for students taking Algebra I, Algebra II, Biology, and US History. Chemistry and Geometry achievement tests will be added in 1989, and other tests are being planned.[a]

To facilitate the proper technical use of the test scores obtained from the administrations of the tests, the curricular and psychometric characteristics of the tests will be described in a series of technical manuals. This manual contains a description of the characteristics of the Minimum Skills Diagnostic Tests (MSDT). These tests are components of the statewide annual testing program.

[a]Readers who have an interest in the origins of the test development program are referred to the North Carolina Elementary and Secondary School Reform Act of 1984, the North Carolina Basic Education Program, the North Carolina Standard Course of Study, and the Teacher Handbook.

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DESCRIPTION

North Carolina Promotion Testing Program. In 1984 the state of North Carolina, through the development of the Basic Education Program, established mastery levels in reading, language arts, and mathematics for the promotion of students in grades three, six, and eight. A three-stage promotion/retention process has been implemented to make decisions based on the mastery of the subject matter at these grade levels.

Phase I of the promotion testing program consists of the administration of the California Achievement Tests (CAT) as a component of the Annual Testing Program. The CAT assesses mastery of skills in reading, language, spelling, and mathematics. Students who score at or above the 25th percentile of the national norm group for their grade on the CAT Total Battery satisfy the state's competency requirement for promotion. Students must then meet the promotion requirements of the local school district. Students who score below the 25th percentile on the CAT, have not repeated a grade in their grade sequence (K-3, 4-6, 7-8), and are not classified as educable mentally handicapped, trainable mentally handicapped, or severely/profoundly handicapped are required to proceed to Phase II of the testing program.

In Phase II, a student is tested for mastery of the basic competencies established by the State Board of Education. The North Carolina Minimum Skills Diagnostic Tests (MSDT: Phase 2) were developed to assess an individual's degree of mastery of the reading, language arts, and mathematics skills necessary for successful performance at the next grade level. Students who perform at or below an established cut-off score on the MSDT receive remedial instruction during a state-funded summer school program.

Following summer school, students complete Phase III of the promotion testing program and take the MSDT again (called the MSDT: Phase 3). Promotion/retention decisions are made in accordance with local school district standards. There is no state cut-off score for the Phase III tests.

Minimum Skills Diagnostic Tests (MSDT). There are two forms of the MSDT (A and B) used in Phase II of the testing program and each form contains three subtests corresponding to the three subject areas (reading, language arts, and mathematics). Each subtest consists of 99 items presented in objective sequence, with the exception of the Grade 3 Mathematics subtest which has 104 items. The tests are designed to be administered over three testing sessions that last approximately 2 hours each and the tests are administered in the following order: Reading, Language Arts, and Mathematics.

The MSDT: Phase 2 tests are designed to be objective-specific, and, as such, they concentrate directly on material presented in the classroom as a basis for measuring performance.

The tests provide a detailed diagnostic profile of each student's strengths and weaknesses in the areas of reading, language arts, and mathematics; consequently, summer school can be tailored to meet the student's needs. Items

on the Reading subtest are written at the minimum competency levels established by the State Board of Education and at additional, lower diagnostic levels (i.e., for the Grade 3 Reading subtest there are reading passages at the Grade 1.5, 2.0, 2.5, and 3.0 reading levels).

The tests used in Phase III of the testing program are identical to the Phase II tests in objective coverage and are primarily intended to provide summary information for evaluating the summer school program.

The MSDT: Phase 3 tests consist of two versions: long and short. The long versions of the MSDT: Phase 3 tests are identical to the Phase 2 tests and, consequently, are able to provide individual diagnostic information. The short versions of the MSDT: Phase 3 tests consist of a random selection of items on the Phase 2 tests. Each short version test form contains 99 items that are evenly distributed across the three content areas. The short version tests are useful in measuring the overall achievement of students in Reading, Language Arts, and Mathematics at the conclusion of summer school. The Phase 3 tests were designed to have the same means and standard deviations as the Phase 2 tests so that improvements in mastery of the minimum competency objectives can be assessed.

VALIDITY

The development of minimum competency tests in Reading, Language Arts, and Mathematics has a dual purpose: (1) to make decisions about whether a particular student has mastered the current material and whether the next level of instruction may proceed and (2) if inadequate mastery is evident, just how inadequate it is. Teachers and administrators need to know just how far below some standard the student fell before effective remediation can begin. To accomplish these two purposes meaningfully, the test scores must be valid. If the test scores are not valid, one inference drawn from a test score may be valid, while another may not be valid.

Theoreticians insist correctly that only inferences concerning test scores can be said to have validity. Generally, readers understand this, and here the convenient shorthand will be employed of speaking about "test validity" rather than "inferences about achievement drawn from scores obtained from tests."

Test validity is a predominant theme in test development, from the time the idea for a test is conceived until the final test scores have been analyzed and interpreted. For convenience, the various components of test validity will be described as if they were unique, independent components rather than interrelated parts. The first component of test validity to be described will be curricular validity.

Curricular validity. If a test is to be used to measure the degree to which a course of study has been mastered, the first step is to define the curriculum. In the case of Reading, Language Arts, and Mathematics, this was done through a cooperative effort, lead by NCDPI Instructional Services, involving curriculum specialists, teachers, administrators, university professors, and others. The result was a list of goals and objectives for each subject area at each grade level based upon the curriculum and courses of instruction listed and described in the Basic Education Program. Supported by expert opinion and a statewide consensus, these goals and objectives were approved by the State Board of Education as the basis for instruction in reading, language arts, and mathematics in grades three, six, and eight.

The minimum competency objectives were adapted from the objectives stated in the North Carolina Standard Course of Study for each grade level and subject area and were determined to be necessary for successful performance at the next grade level. The objectives are listed in the appendix by grade level and content area within grade level. Where necessary, objectives were interpreted into a specific skill or the recognition of the correct use of the specific skill.

Instructional validity. Items were written that tested the basic minimum competency objectives in reading, language arts, and mathematics. The items reflected the minimum competency levels prepared by the NCDPI Divisions of Communication Skills and Mathematics and adopted by the State Board of Education as the basic minimum competency levels in grades three, six, and eight in reading, language arts, and mathematics.

Content validity of the item pools. Content validity—the degree to which test items reflect the basic instructional program—was defined through a number of operations:

First, the item pools of the Reading, Language Arts, and Mathematics subtests were created. Each item pool was to consist of 600 items per grade level (a total of 1800 items per content area) that were matched to the objectives of the reading, language arts, and mathematics minimum competency level objectives described earlier. The items were purchased from a test development company.

A computer search of the company's item bank was utilized to find items that matched the test specification guidelines. An item was selected for inclusion in an item pool if it met the following criteria: (1) matched a minimum competency objective in one of the three content areas, (2) had appropriate statistical characteristics, and (3) was appropriate for students in grades three, six, or eight scoring below the 25th percentile on a nationally-normed achievement test. Sample items were reviewed by the Annual Testing Commission and personnel in NCDPI Instructional Services (Mathematics and Communication Skills Divisions). Acceptable items were used as models for the development of items written by the test development company personnel for the MSDT. The following percentages of items within each item pool were written specifically for the MSDT: reading - 81%, language arts - 93%, and mathematics - 86%.

Second, the item pools were edited for grammar, syntax, psychometric form, and linguistic bias by the test development company personnel and NCDPI staff.

Third, the item pools were analyzed by curriculum specialists in NCDPI Mathematics and Communication Skills Division, teachers, and the Annual Testing Commission to assure that the items were valid representations of the objectives for which they were developed. Each item was reviewed by six to eight classroom teachers and at least once in each of the eight educational regions of the state. The criteria for evaluating each item included the following: particular characteristics of the item (objective match, artwork, vocabulary, print size/type style, and format), bias (gender, ethnicity, economic, regional, geographical), and appropriateness for students for whom the items were designed.

On the basis of the first three steps in the content validity process, 5400 items were available in the item pools for use in test development. For each subject area at each grade level 600 items were developed for field testing.

Fourth, the items in each item pool were collected into test forms for field testing. Thirty-six field tests were assembled at each grade level (12 Reading, 12 Language Arts, and 12 Mathematics). Although the forms were not the final forms of the Minimum Skills Diagnostic Tests, they were organized in such a way that all of the objectives were represented across all test forms. Each field test form contained 60 items, 10 of which were common across all test forms of the same content area and grade level. The common items were not part of the original item pools and were included for the purpose of ability equating should that become necessary.

Fifth, test administration instructions were written, test distribution procedures were organized, and administrators were trained to conduct the test

administrations. The administration of the test forms followed the routine eventually expected to be used when the tests of record are given.

Sixth, samples of students were selected to take the 36 MSDT field tests at each grade level. All students who had scored at or below the 30th percentile were selected to take the item fieldtests. Students scoring between the 25th and the 30th percentile were included because a projected re-norming of the CAT was expected to place students scoring at the 30th percentile below the 25th percentile in the new norms. To insure broad representation, schools were selected from all of the Local Education Associations (LEA) in the state. Approximately 200 to 400 students per grade level within a particular LEA were tested with one form of a given subtest at grade 3, one form of a different subtest at grade 6, and one form of the third subtest at grade 8. Each form of the three subtests was administered in four LEA's randomly selected from across the state.

Seventh, the item field test data were analyzed using the classical psychometric model and the one-parameter Rasch model (BICAL program). Eight statistics were assembled for every item: item characteristics curve groupings, p-value, Rasch difficulty index, Adjusted-Rasch difficulty index, standard error of the mean, fit mean-square, item reliability (point-biseral correlation), and the item validity (point-biseral correlation). These statistics were reviewed and decisions were made about the psychometric adequacy of the items.

Due to the selective nature of the MSDT, the maximization of item-total correlations (point-biseral correlations) was not a primary goal of item development. The subject area domains were selective because they involved only a restricted sample of items which were appropriate to the bottom 25th percentile group on a nationally-normed test. Also, the sample group of students was selective because the test was administered only to those students in the bottom 30% on a national sample; the sample group corresponded to only 10-15% of the North Carolina grade school population.

The psychometric decisions were then conveyed to the curriculum specialists, who also reviewed the items and reached a decision about their curricular adequacy.

This information was then placed on the item record, which became the basic document to which all other records were referred. The item record contains the goal, objective, historical information, a copy of the item itself, the item tryout statistics, and the psychometric and curricular decisions concerning the item's suitability for use in a test. Each item had a separate item record.

Of the 1800 field-tested reading items, 273 (15%) were deleted due to statistical flaws or as a result of review by curriculum specialists. Forty-six items were transferred to other objectives to yield a better item-objective match. The items that were psychometrically deleted were revised where possible (239) or rewritten (34) for use in further test development. After psychometric and curricular evaluation, 1784 items remained in the reading item pool for use in the development of test forms for statewide testing. The following numbers of items remained in the pool for each grade level: 3rd - 597 items, 6th - 597 items, and 8th - 590 items.

Of the 1800 field-tested language arts items, 120 (7%) were deleted due to

statistical flaws or as a result of review by curriculum specialists. One item was transferred to another objective to yield a better item-objective match. The items that were psychometrically deleted were revised where possible (84) or rewritten (36) for use in further test development. After psychometric and curricular evaluation, 1786 items remained in the language arts item pool for use in the development of test forms for statewide testing. The following numbers of items remained in the pool at each grade level: 3rd - 600 items, 6th - 599 items, and 8th - 587 items.

Of the 1800 field-tested mathematics items, 259 (14%) were initially deleted due to statistical flaws or as a result of review by curriculum specialists. The items that were psychometrically deleted were revised where possible (185) or rewritten (74) for use in further test development. After psychometric and curricular evaluation, 1799 items remained in the mathematics item pool for use in the development of test forms for statewide testing. The following numbers of items remained in the pool for each grade level: 3rd - 600 items, 6th - 600 items, and 8th - 599 items.

Content validity of the tests. After a consideration of the logistics involved and the size of the item pools at each grade level, it was decided to prepare two forms of the MSDT. The item selections for each of the subtests were based on a different content specification. The Reading subtest items were selected by sampling reading passages rather than specific items. This procedure led to an irregular representation of objectives by items. The Language Arts objective representations were weighted by curriculum specialists and, consequently, resulted in an irregular representation of items. The rule was employed that each objective was to be measured by at least six items. The Mathematics subtest items were distributed as evenly as possible, with three or four items per objective.

After the subject area specifications had been met, items were chosen at random from the available items for an objective. This method of item selection is a modified domain sampling model, with the various forms of the tests randomly equivalent. The domain sampling model in its pure form is highly inefficient because it allows the entry of items that are grossly inappropriate for normative measurement—items that no one can answer or that everyone can answer, or items that have psychometric deficiencies of a more complex form. In the modification used here, the domains of items were limited to those items that had satisfactory psychometric characteristics and were related to the subject areas. This was determined by the analyses of the item fieldtest data, which were used to verify the psychometric adequacy of the item pools and to direct where item revisions should be made.

Once the tests were assembled into test forms, they were reviewed by one curriculum supervisor and two teachers in each educational region. The criteria for evaluating each form of the MSDT included the following: answer key (correct/incorrect), artwork (accurate/inaccurate and clear/unclear), representativeness for sample to be tested, and bias (gender, ethnic, socioeconomic status, geographic, and other).

Although the initial equating of the forms of the MSDT depended upon random selection of the items from the pools, the final equating was based on statistics obtained at the time the first test of record was administered. This

second psychometric analysis, described next ,was used to eliminate random differences between the forms and thus facilitate the precision of measurement from one year to the next.

Standardization samples. The first administration of the North Carolina Minimum Skills Diagnostic Tests consisted of Form A administered in 1986 to all third, sixth, and eighth grade students who scored below the 25th percentile on the CAT Total Battery, Form E. The tests was administered to 2,762 3rd grade students; 5,263 6th grade students; and 5,092 8th grade students. The state norm population comprises these students at each grade level.

At approximately the same time, Form B of the MSDT was administered to random samples of the students required to take Form A of the MSDT. At grade 3, approximately 560 students took both forms of the MSDT; at grade 6, approximately 500 students took both forms of the MSDT; and at grade 8, approximately 450 students took both forms of the MSDT.

Construct validity of the tests. The construct validity of a test is the extent to which the test may be said to measure a theoretical construct or trait. One way to assess the construct validity of a test is to compare scores on a test before and after an intervention is administered that is believed to affect the individual's performance on the test.

The MSDT: Phase 2 test (pretest) is administered at the end of the school year and prior to the beginning of the summer school program. At the end of the summer school program the MSDT: Phase 3 test (posttest) is administered to assess the student's improvement in reading, language arts, and mathematics. Table 1 presents the average scores on the Phase 2 and Phase 3 tests for individuals in grades 3, 6, and 8. The average gain in percentage of correct responses is also presented.

All of the gains in percentage of correct responses from the pretest to the posttest are statistically significant at the .01 level. From the data in Table 1 it can be concluded that students are mastering the minimum competency objectives that are being assessed by the MSDT.

Criterion-related validity of the tests. Criterion-related validity indicates the effectiveness of a test in predicting an individual's behavior in a specific situation. Criterion-related validity is established when the performance of an individual on a test is checked against an external criterion, i.e., a direct and independent measure of that which the test is designed to measure.

An often used criterion is performance in a specialized training program, such as summer school. The decision to promote individuals to the next grade level or retain them in the present grade level is assessed by their performance in summer school. The promotion/retention decision is based mainly on the following criteria: teacher recommendation, principal recommendation, classroom observation, and summer school attendance. The promotion/retention decision is an independent measure of achievement and, therefore, may be used as a criterion measure to assess the validity of the MSDT as a measure of achievement.

Table 1

Statewide Results of the MSDT: Phase 2 and Phase 3[a] Tests Administered in 1986 (Form A) and 1987 (Form B)

Grade	Form	N	Phase 2 Mean	Phase 3 Mean	Average Gain
Grade 3	A	1599	57.2	67.2	15.0
	B	1185	52.3	65.6	13.3
Grade 6	A	3079	55.0	66.7	11.7
	B	1038	55.9	67.5	11.6
Grade 8	A	3097	56.8	65.5	8.7
	B	1433	56.8	66.2	9.4

[a]MSDT: Phase 3 (short version)

Table 2

Average Gain Scores on the 1987 Administration of the MSDT: Phase 2 and Phase 3 Tests for Promoted and Retained Students[a]

Grade	Version	Promoted N	Promoted Gain	Retained N	Retained Gain	Difference
Grade 3	Short	1957	10.2	681	9.2	1.0
	Long	901	8.6	269	4.8	3.8*
Grade 6	Short	3868	8.7	197	7.6	1.1
	Long	1642	5.8	101	3.4	2.4
Grade 8	Short	4830	7.1	67	6.6	0.5
	Long	1829	5.3	51	3.4	1.9

*$p < .05$

[a]Based on students who took the MSDT: Phase 2 and Phase 3 tests.

For the MSDT to have satisfactory criterion-related validity, students who gain the most during summer school should be the ones who are promoted to the next grade level based on local recommendations. Table 2 presents the average scores on the MSDT posttest for students who were promoted to the next grade and for students who were retained in the current grade.

The only significant difference in average gain scores between promoted and retained students was at the third grade level for students who took the long version of the MSDT: Phase 3 tests. The other differences in gain scores are in the hypothesized direction, but are not statistically significant. While the data is not conclusive about the criterion-related validity of the MSDT, it is positive.

METHOD FOR DERIVING TEST SCORES

Item information was available to support the classical scoring model and the Rasch scoring model. The classical scoring model gives a unitary weight to each item; a correct choice adds 1 to the total score and an incorrect choice adds 0. The one-parameter Rasch model also uses unitary weighting. (The two- and three-parameter item response models give more credit for answering some items correctly, and less credit for answering other items correctly. These models assume that each item has a fundamental, unchanging difficulty level.) The classical scoring model was utilized to score the North Carolina Minimum Skills Diagnostic Tests because it was fundamentally sound, simple to use, and easy to interpret.

In addition to total scores for each subtest on the MSDT, diagnostic scores are computed for each objective. A diagnostic profile is developed for each student so that his/her individual needs may be met by the summer school program.

RELIABILITY AND OTHER STATISTICS

The descriptive statistics, the standard errors of measurement, and the alpha reliability coefficients from the administration of the first test of record (May 1986) of the Minimum Skills Diagnostic Tests (Forms A and B) are presented in Table 3. The alpha reliability estimates range from .88 to .97.

The first fieldtest administration of the MSDT was in October 1985. The purposes of the administration were to determine alternate-form reliability, to measure administration time of the the two test forms (A and B), and to set promotion/retention standards. The two forms of the subtests were field-tested with samples of students in grades three, six, and eight. Three groupings of the subtests were given at each grade level: (1) Reading-A, Reading-B, & Language-A; (2) Language-A, Language-B, & Mathematics-A; and (3) Mathematics-A, Mathematics-B, & Reading-A. Approximately 500 students were administered each grouping of the three subtests at each grade level. The alternate form reliability estimates are presented in Table 3 and range from .74 to .90.

The alpha reliability, although respectfully high, is based on an attenuated sample of the population: students who scored below the 30th percentile on the California Achievement Tests, Form E. The alternate form reliability is based on an even more attenuated sample: students who scored below the 25th percentile. This accounts for the alternate form's reliability being slightly less than expected (generally 5-8 points below alpha).

Table 3

Descriptive Statistics for the Minimum Skills Diagnostic Tests (MSDT)

Subject	Form	Mean	SD	Median	se_{meas}	Reliability Alternate Form	Reliability Coefficient Alpha
Grade 3							
Reading	A	60.1	23.0	69.0	4.60	0.89	0.96
	B	59.4	22.3	67.0	4.46	0.89	0.96
Language	A	67.0	19.4	70.0	4.34	0.90	0.95
	B	67.3	18.8	74.0	4.20	0.90	0.95
Math	A	67.4	16.3	71.2	4.31	0.87	0.93
	B	68.0	16.5	73.1	4.37	0.87	0.93
Grade 6							
Reading	A	56.8	15.9	61.0	4.50	0.82	0.92
	B	56.5	17.6	61.0	4.66	0.82	0.93
Language	A	69.6	17.1	75.0	4.19	0.84,0.85	0.94
	B	67.9	17.3	-	4.24	0.84	0.94
	B*	69.3	17.3	73.7	-	0.85	-
Math	A	43.0	13.3	44.0	4.80	0.79	0.87
	B	43.3	13.0	43.0	4.50	0.79	0.88
Grade 8							
Reading	A	52.0	15.4	58.0	4.87	0.83,0.85	0.90
	B	56.0	15.7	53.0	4.44	0.83	0.92
	B*	52.0	15.4	55.0	-	0.85	-
Language	A	68.8	13.5	71.0	4.05	0.84	0.91
	B	67.2	13.5	-	4.48	0.84	0.89
	B*	68.6	13.6	72.0	-	0.84	-
Math	A	53.2	13.1	55.0	4.72	0.74,0.77	0.87
	B	50.0	12.4	-	4.47	0.74	0.87
	B*	53.2	12.7	55.0	-	0.77	-

* Equated (adjusted) Form

Of special significance to the comparability of student scores across the years is the equivalence of Form B to Form A (the first statewide test of record). An equipercentile analysis was made of the relationship of Form B to Form A. To make this equipercentile comparison, the mean of a block of scores within successive five percentile points on Form A was taken to compare with the mean of a block of scores within the same successive five percentile points on Form B. This yielded twenty reasonably reliable points of comparison.

In Figures 1 through 5, 7, 8, 10, and 12 the differences of the data points from perfect agreement (a slope of 1.00) for Forms A and B of each subtest at each grade level are small. The differences between Forms A and B of the grade 3 Reading, Language Arts, and Mathematics subtests and of the Grade 6 Mathematics and Reading subtests are minimal, and it was therefore not necessary to equate Form B any further.

The differences between Forms A and B of the Grade 6 Language Arts subtest and of the Grade 8 Language Art s, Mathematics, and Reading subtests could be adjusted statistically by providing a separate set of norms for each form. A simple and efficient alternative is to redevelop Form B of each subtest slightly so that even the small differences disappear. To accomplish this transformation, the items and associated psychometric data were available from the administration of Form A. The results of the adjustments on these subtests are given in Table 3 and Figures 6, 9, 11, and 13

The required changes were minimal, with the alternate form reliability increasing for all of the equated subtests. Two items were changed on the Grade 6 and the Grade 8 Language Arts subtests to equate Form A with Form B at each grade level. Six items were changed on the Grade 8 Mathematics subtest to equate Form A with Form B. Eleven items where changed on the Grade 8 Reading subtest to equate Form A with Form B.

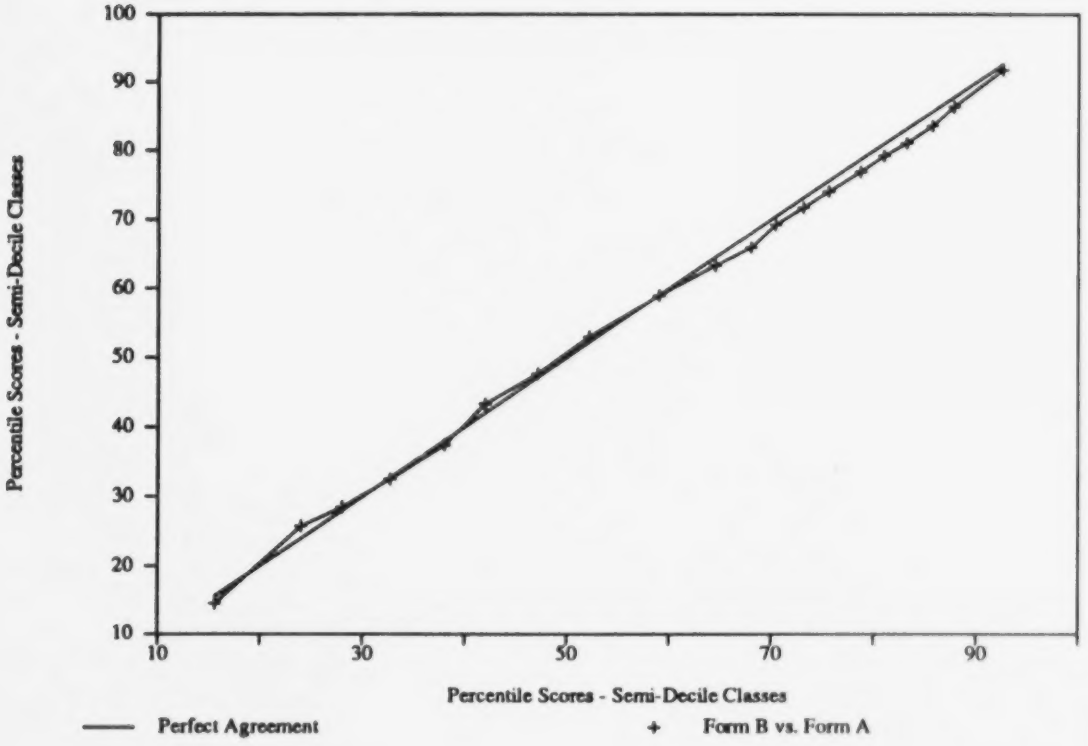

Figure 1. Equipercentile comparison of the Grade 3 MSDT Reading subtest Form A (administered statewide) with the field test Form B.

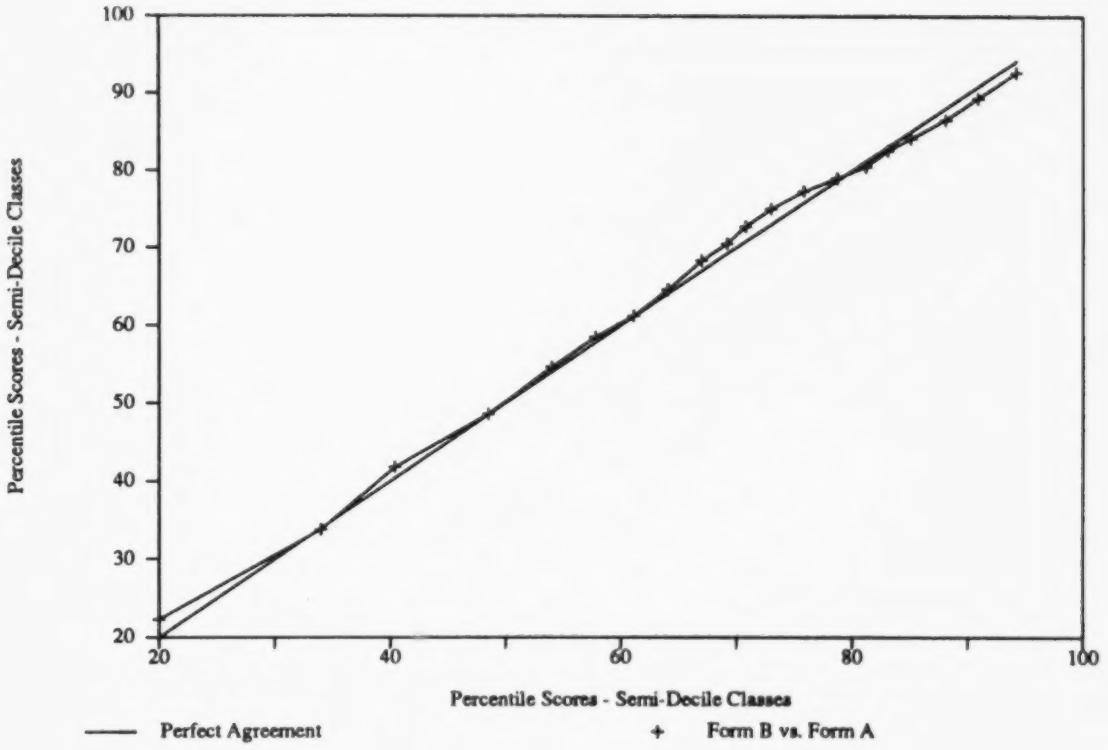

Figure 2. Equipercentile comparison of the Grade 3 MSDT Language Arts subtest Form A (administered statewide) with the field test Form B.

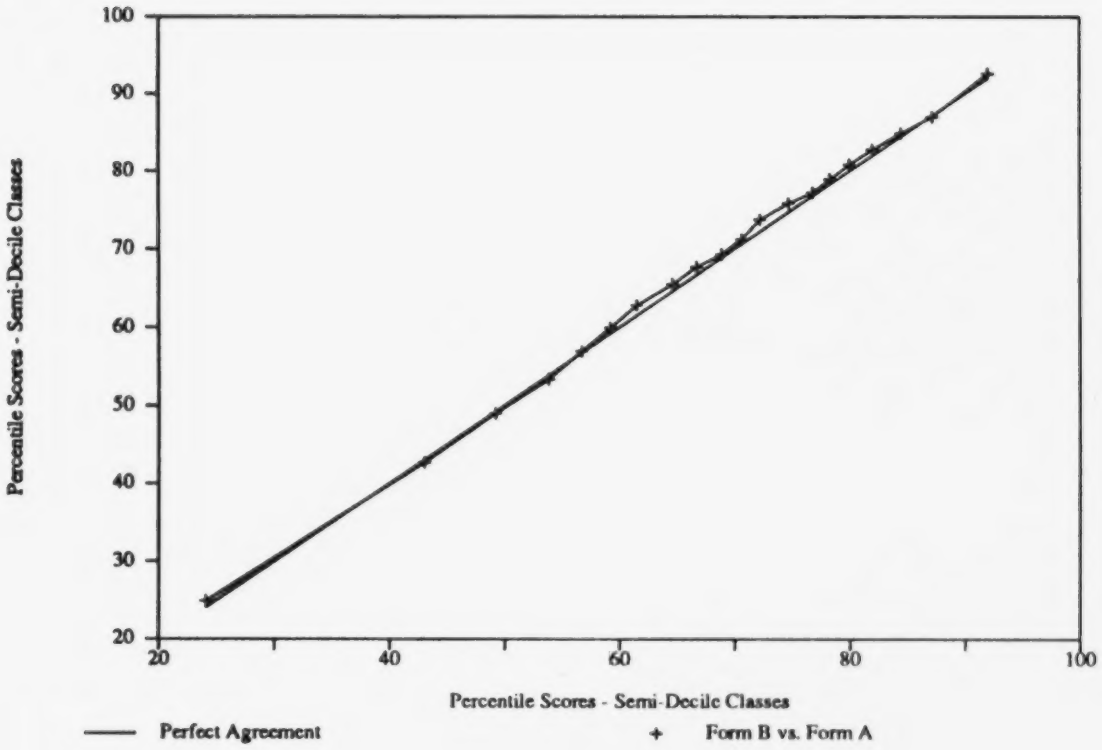

Figure 3. Equipercentile comparison of the Grade 3 MSDT Mathematics subtest Form A (administered statewide) with the field test Form B.

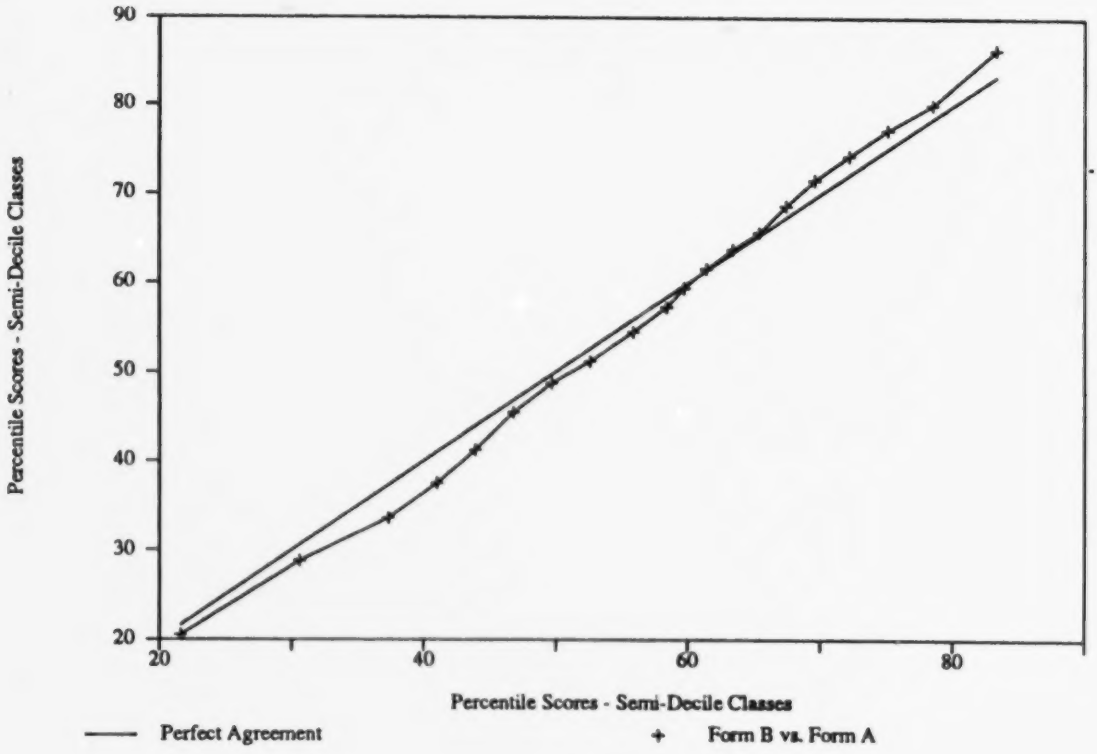

Figure 4. Equipercentile comparison of the Grade 6 MSDT Reading subtest Form A (administered statewide) with the field test Form B.

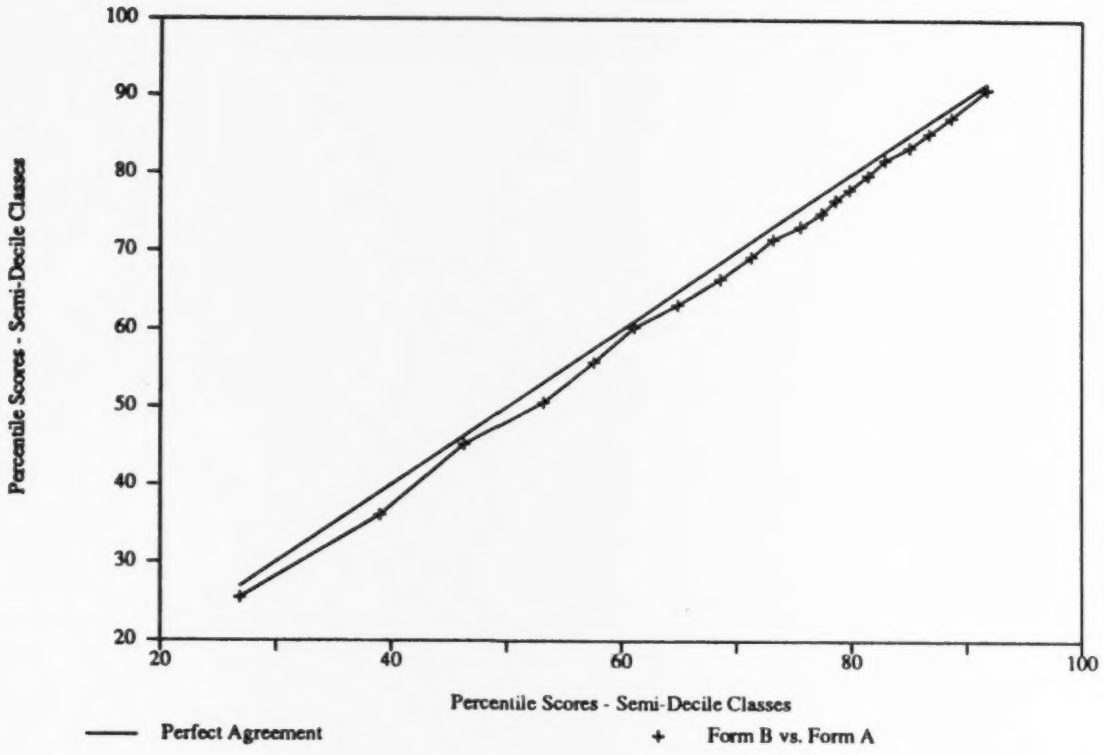

Figure 5. Equipercentile comparison of the Grade 6 MSDT Language Arts subtest Form A (administered statewide) with the field test Form B.

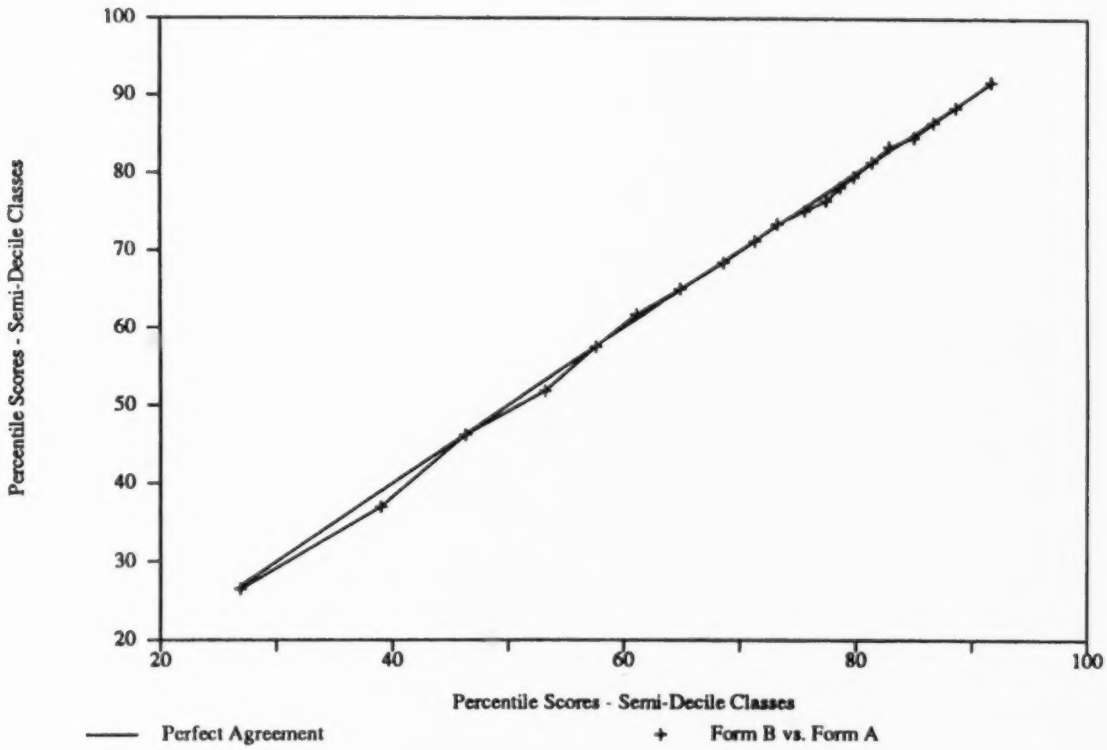

Figure 6. Equipercentile comparison of the Grade 6 MSDT Language Arts subtest Form A (administered statewide) with the revised field test Form B.

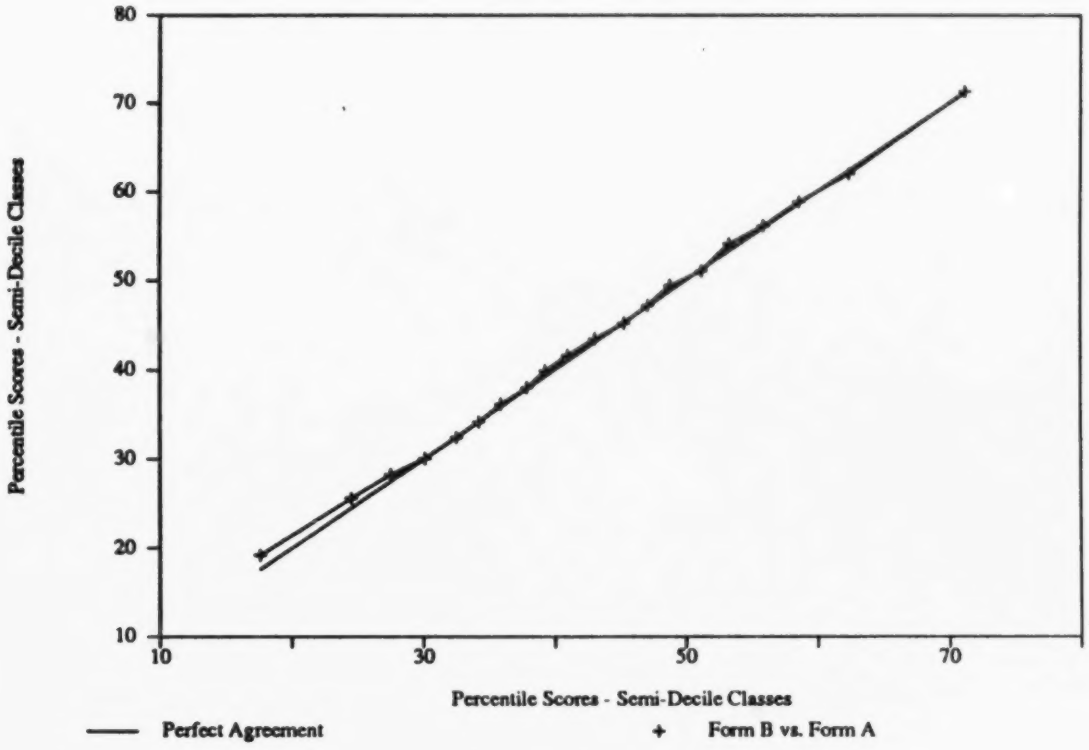

Figure 7. Equipercentile comparison of the Grade 6 MSDT Mathematics subtest Form A (administered statewide) with the field test Form B.

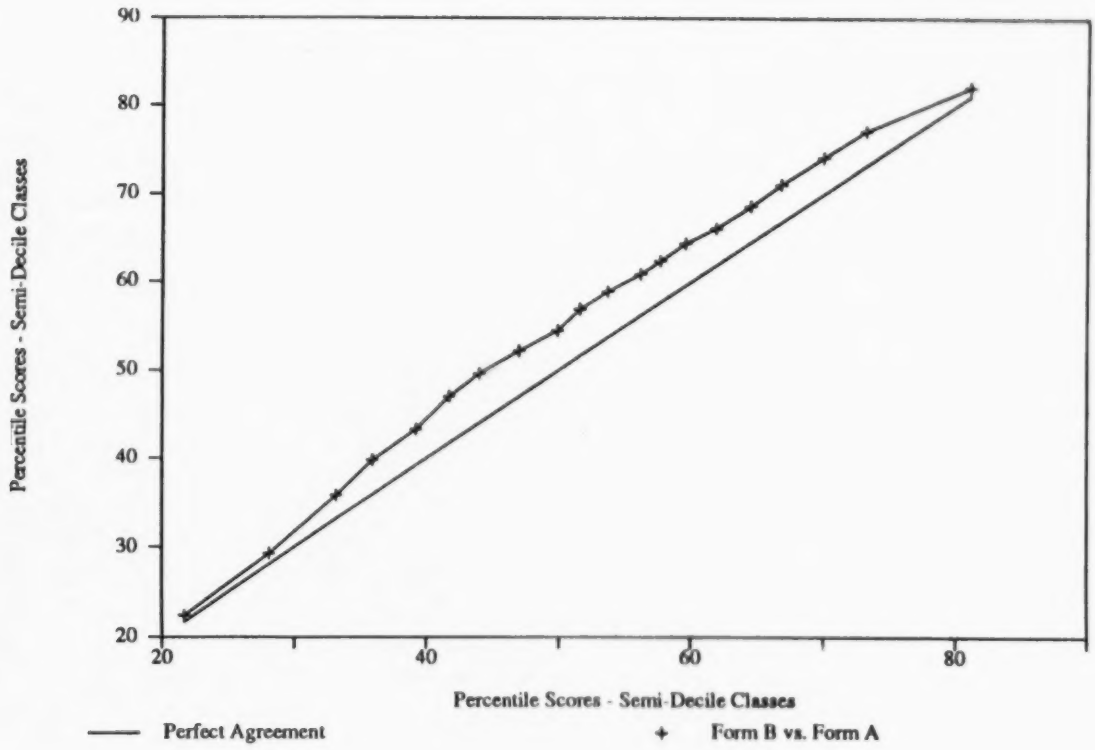

Figure 8. Equipercentile comparison of the Grade 8 MSDT Reading subtest Form A (administered statewide) with the field test Form B.

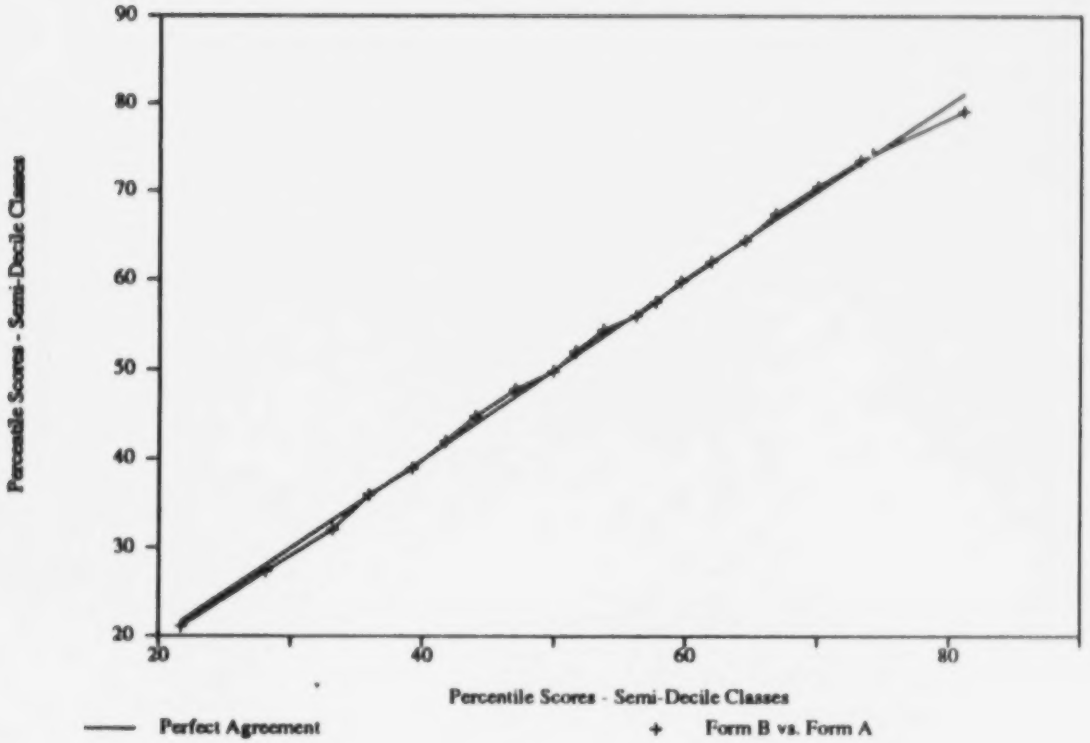

Figure 9. Equipercentile comparison of the Grade 8 MSDT Reading subtest Form A (administered statewide) with the revised field test Form B.

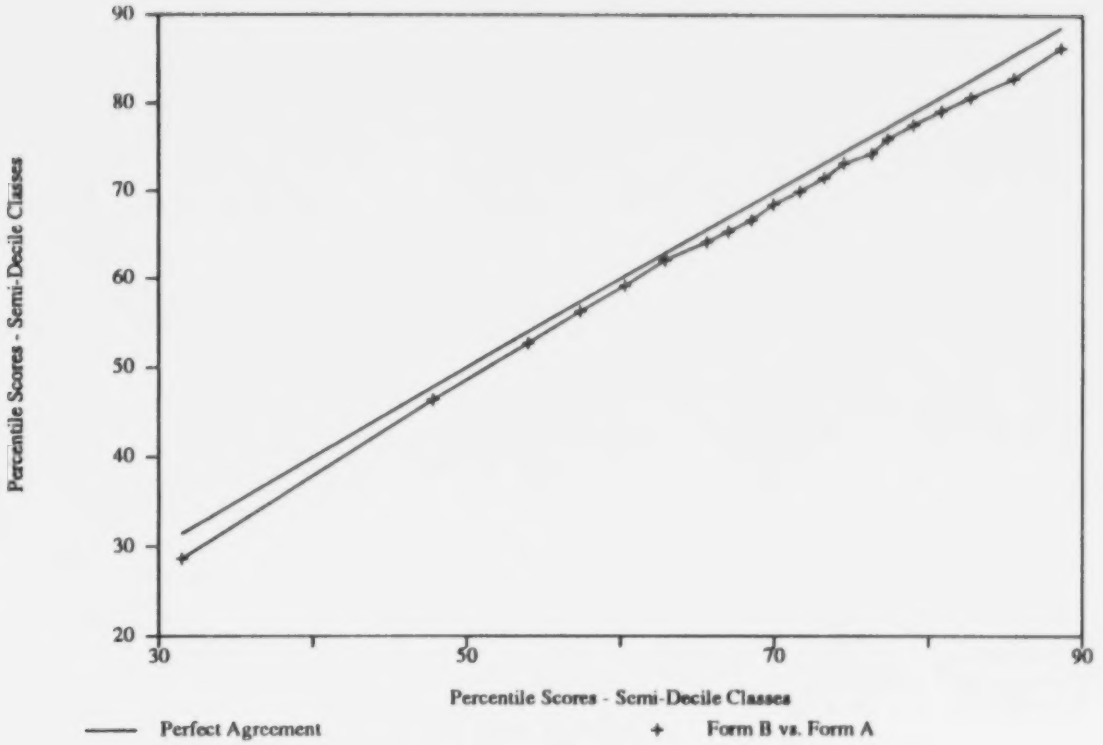

Figure 10.Equipercentile comparison of the Grade 8 MSDT Language Arts subtest Form A (administered statewide) with the field test Form B.

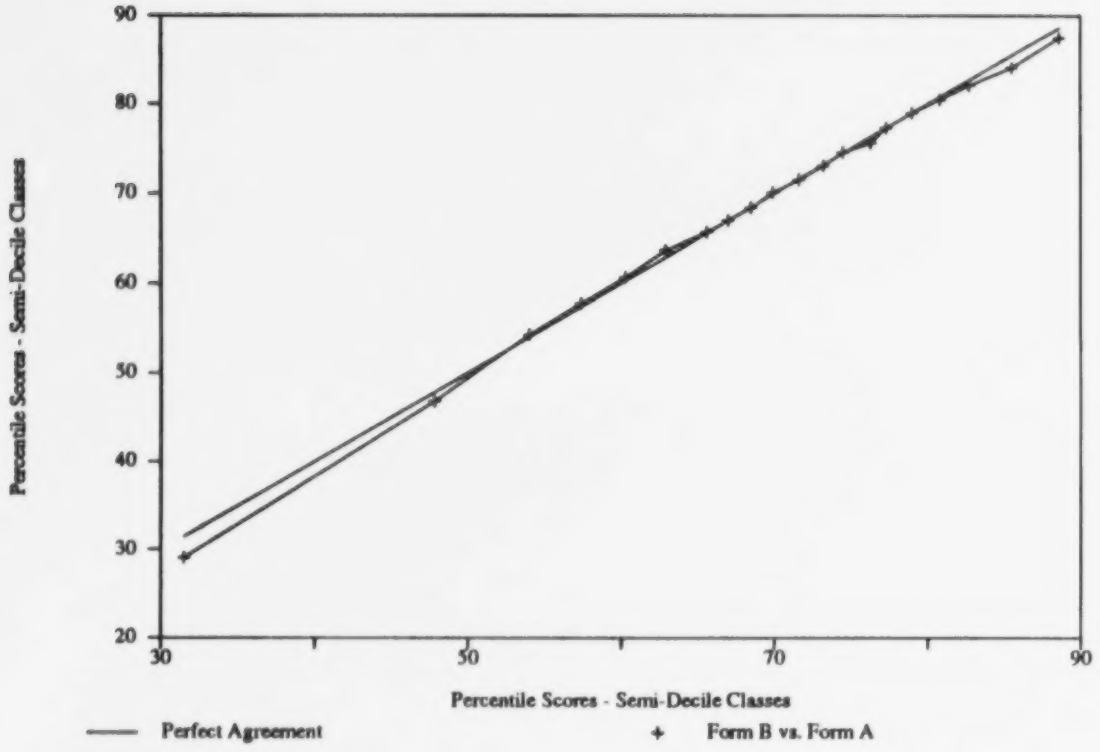

Figure 11.Equipercentile comparison of the Grade 8 MSDT Language Arts subtest Form A (administered statewide) with the revised field test Form B.

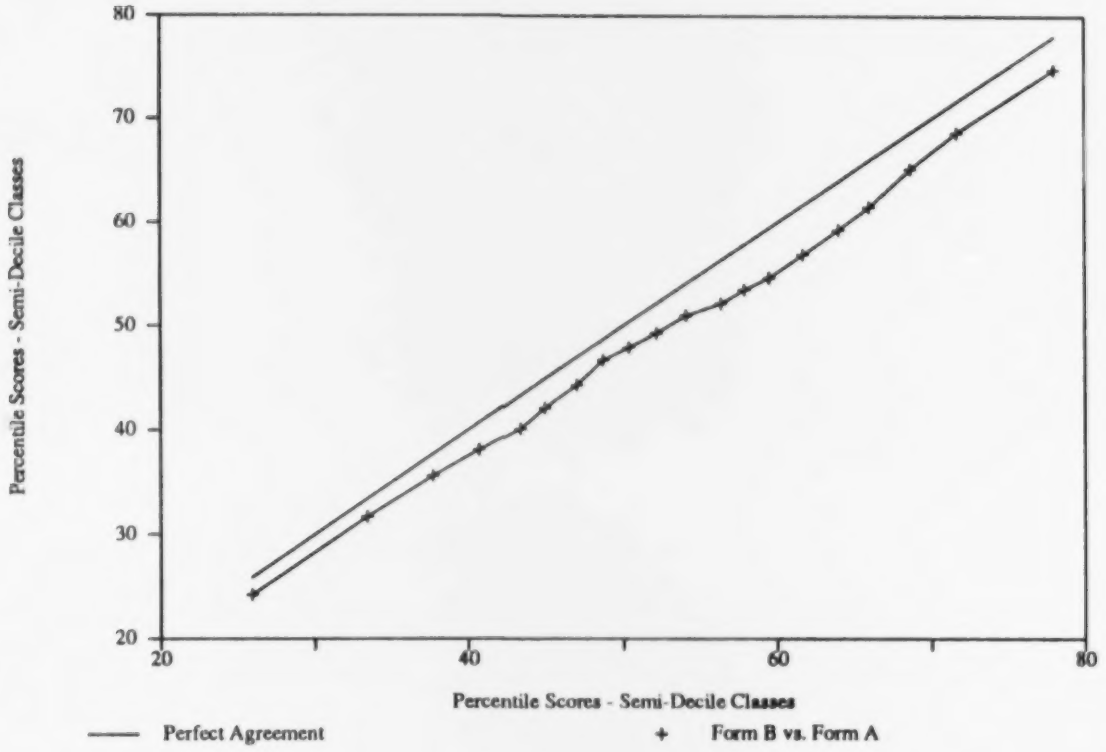

Figure 12. Equipercentile comparison of the Grade 8 MSDT Mathematics subtest Form A (administered statewide) with the field test Form B.

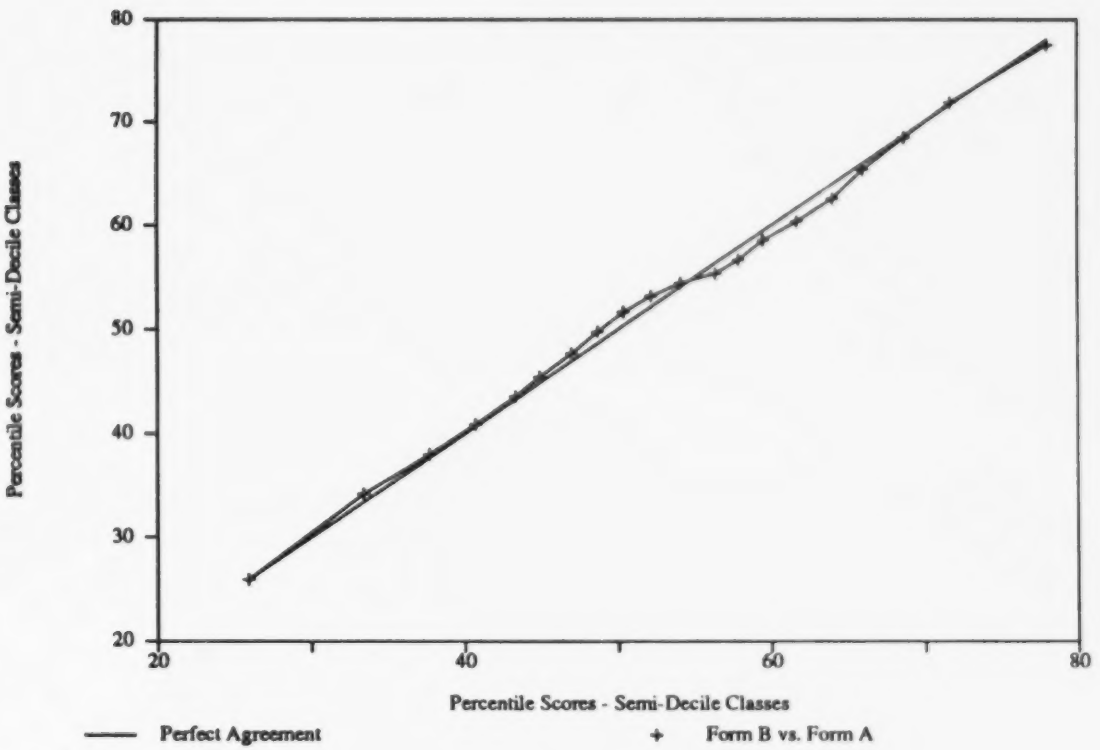

Figure 13. Equipercentile comparison of the Grade 8 MSDT Mathematics subtest Form A (administered statewide) with the revised field test Form B.

CONTENT OF THE TESTS

The Minimum Skills Diagnostic Tests for grades three, six, and eight each contain three subtests: Reading, Language Arts, and Mathematics. Each subtest contains 100 items, with the exception of the Grade 3 Mathematics subtest which contains 104 items. Within each subtest, objectives are represented randomly by items and are presented in objective order.

The appendices list each minimum competency objective at each grade level and its associated numerical item representation for each subtest on the Minimum Skills Diagnostic Tests (Forms A and B).

Tables 4 through 9 list the difficulty level for each item tested on Forms A and B of each subtest at each grade level in terms of the proportion of all students answering the item correctly.

Table 4

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Reading Subtests - Form A

Item Number	Proportion of Correct Responses Grade 3	Grade 6	Grade 8
1	.903	.695	.893
2	.837	.828	.689
3	.656	.663	.768
4	.470	.784	.527
5	.432	.871	.468
6	.588	.885	.616
7	.532	.816	.798
8	.484	.717	.470
9	.625	.562	.323
10	.805	.422	.434
11	.703	.812	.832
12	.663	.630	.761
13	.799	.598	.755
14	.806	.653	.730
15	.591	.529	.659
16	.606	.677	.691
17	.640	.564	.680
18	.740	.305	.645
19	.740	.816	.584
20	.441	.519	.723
21	.708	.828	.336
22	.833	.792	.734
23	.651	.907	.332
24	.507	.760	.850
25	.776	.602	.248
26	.627	.806	.409
27	.638	.853	.852
28	.826	.859	.884
29	.683	.626	.689
30	.604	.834	.850
31	.769	.877	.841
32	.672	.487	.593
33	.342	.889	.580
34	.629	.915	.757
35	.496	.364	.682
36	.468	.685	.375
37	.450	.398	.439
38	.461	.828	.511
39	.579	.717	.770
40	.638	.709	.780

TABLE 4 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Reading Subtests - Form A

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
41	.419	.558	.402
42	.323	.531	.307
43	.470	.642	.600
44	.538	.257	.534
45	.525	.715	.320
46	.595	.450	.384
47	.319	.461	.561
48	.579	.446	.416
49	.482	.432	.534
50	.473	.703	.623
51	.351	.586	.705
52	.516	.378	.761
53	.654	.531	.491
54	.663	.287	.400
55	.690	.661	.834
56	.661	.265	.443
57	.729	.535	.398
58	.647	.562	.689
59	.735	.418	.307
60	.514	.618	.336
61	.577	.675	.570
62	.760	.311	.423
63	.611	.487	.334
64	.720	.578	.568
65	.550	.428	.407
66	.625	.354	.386
67	.733	.269	.391
68	.685	.515	.484
69	.661	.596	.491
70	.602	.717	.586
71	.667	.651	.475
72	.683	.414	.359
73	.450	.699	.205
74	.452	.687	.318
75	.722	.590	.486
76	.588	.333	.475
77	.441	.275	.636
78	.527	.432	.243
79	.695	.343	.439
80	.353	.549	.543

TABLE 4 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Reading Subtests - Form A

Item Number	Proportion of Correct Responses Grade 3	Grade 6	Grade 8
81	.746	.628	.336
82	.489	.646	.405
83	.613	.651	.382
84	.473	.602	.473
85	.362	.279	.564
86	.559	.693	.332
87	.686	.580	.391
88	.556	.675	.289
89	.778	.196	.307
90	.461	.489	.423
91	.611	.248	.502
92	.588	.382	.316
93	.651	.309	.470
94	.484	.352	.370
95	.536	.248	.384
96	.658	.259	.336
97	.599	.459	.316
98	.539	.382	.398
99	.731	.285	.261
100	.568	.455	.330

TABLE 5

Item Difficulty by Item Number for the Minimum Skills Diagnostic Skills Tests
Reading Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
1	.903	.861	.434
2	.783	.741	.323
3	.685	.713	.725
4	.710	.764	.645
5	.584	.511	.616
6	.453	.784	.336
7	.690	.861	.386
8	.663	.703	.468
9	.452	.547	.464
10	.729	.450	.448
11	.591	.796	.750
12	.421	.731	.741
13	.629	.671	.773
14	.731	.360	.741
15	.749	.497	.484
16	.611	.495	.584
17	.414	.814	.741
18	.785	.568	.768
19	.330	.321	.539
20	.656	.386	.450
21	.828	.877	.595
22	.823	.760	.336
23	.434	.762	.661
24	.403	.863	.248
25	.789	.812	.418
26	.688	.851	.827
27	.568	.810	.757
28	.819	.826	.902
29	.780	.731	.795
30	.742	.877	.409
31	.737	.883	.402
32	.749	.519	.320
33	.720	.802	.384
34	.385	.511	.561
35	.676	.646	.416
36	.586	.394	.768
37	.419	.424	.441
38	.416	.703	.745
39	.384	.400	.602
40	.547	.756	.616

TABLE 5 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Reading Subtests - Form B

Item Number	Proportion of Correct Responses Grade 3	Grade 6	Grade 8
41	.502	.772	.364
42	.572	.679	.432
43	.360	.501	.675
44	.543	.384	.766
45	.425	.352	.686
46	.565	.703	.450
47	.676	.481	.825
48	.348	.497	.568
49	.477	.804	.473
50	.432	.319	.589
51	.391	.650	.480
52	.717	.301	.525
53	.769	.566	.716
54	.740	.612	.750
55	.699	.774	.373
56	.647	.436	.707
57	.754	.521	.770
58	.572	.451	.723
59	.692	.554	.705
60	.464	.517	.598
61	.536	.693	.689
62	.643	.440	.648
63	.703	.364	.593
64	.706	.362	.664
65	.726	.335	.491
66	.677	.547	.289
67	.618	.434	.270
68	.455	.796	.566
69	.695	.366	.693
70	.663	.309	.693
71	.751	.531	.375
72	.747	.495	.348
73	.651	.481	.314
74	.380	.525	.332
75	.776	.358	.434
76	.565	.485	.464
77	.667	.414	.480
78	.480	.610	.675
79	.491	.600	.418
80	.523	.487	.575

TABLE 5 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Reading Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
81	.676	.469	.407
82	.477	.503	.223
83	.547	.489	.327
84	.434	.444	.286
85	.627	.446	.477
86	.538	.586	.248
87	.432	.410	.364
88	.566	.408	.511
89	.577	.574	.523
90	.312	.450	.368
91	.536	.422	.336
92	.575	.471	.350
93	.461	.440	.220
94	.443	.343	.445
95	.493	.303	.257
96	.532	.469	.350
97	.486	.408	.466
98	.575	.644	.382
99	.475	.440	.243
100	.747	.507	.370

TABLE 6

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Language Arts Subtests - Form A

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
1	.784	.842	.904
2	.827	.854	.777
3	.845	.838	.707
4	.795	.896	.718
5	.784	.503	.656
6	.724	.439	.385
7	.780	.838	.851
8	.768	.768	.595
9	.461	.613	.562
10	.656	.717	.611
11	.858	.677	.604
12	.694	.517	.543
13	.620	.499	.764
14	.714	.852	.941
15	.778	.862	.906
16	.798	.804	.880
17	.771	.778	.842
18	.391	.798	.737
19	.706	.818	.744
20	.865	.349	.794
21	.766	.894	.902
22	.708	.836	.952
23	.537	.832	.961
24	.344	.766	.919
25	.353	.798	.856
26	.373	.796	.724
27	.328	.695	.348
28	.741	.467	.604
29	.764	.465	.816
30	.800	.453	.619
31	.762	.531	.716
32	.301	.659	.567
33	.766	.705	.525
34	.730	.689	.792
35	.773	.619	.691
36	.789	.619	.604
37	.306	.591	.779
38	.425	.691	.510
39	.735	.549	.278
40	.342	.573	.632

TABLE 6 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Language Arts Subtests - Form A

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
41	.623	.627	.479
42	.514	.649	.466
43	.746	.920	.963
44	.443	.800	.591
45	.685	.906	.952
46	.564	.916	.836
47	.683	.858	.908
48	.710	.852	.941
49	.658	.766	.875
50	.515	.902	.961
51	.622	.743	.827
52	.560	.870	.788
53	.634	.681	.812
54	.656	.858	.768
55	.517	.515	.440
56	.524	.874	.613
57	.634	.788	.536
58	.577	.529	.899
59	.611	.437	.932
60	.494	.499	.851
61	.541	.733	.731
62	.744	.754	.707
63	.690	.782	.374
64	.596	.645	.619
65	.685	.635	.687
66	.575	.864	.895
67	.571	.796	.928
68	.780	.567	.880
69	.937	.579	.921
70	.930	.808	.884
71	.926	.729	.814
72	.914	.743	.742
73	.879	.782	.615
74	.867	.739	.538
75	.820	.715	.508
76	.786	.818	.368
77	.836	.786	.641
78	.820	.762	.545
79	.840	.802	.516
80	.863	.782	.508

TABLE 6 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Language Arts - Form A

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
81	.827	.800	.888
82	.881	.707	.794
83	.818	.768	.829
84	.771	.760	.805
85	.683	.752	.670
86	.690	.830	.781
87	.760	.641	.545
88	.723	.649	.735
89	.620	.649	.538
90	.681	.667	.681
91	.537	.663	.761
92	.575	.483	.501
93	.771	.653	.545
94	.679	.567	.584
95	.454	.509	.435
96	.425	.559	.389
97	.782	.463	.416
98	.400	.329	.265
99	.591	.253	.230
100	.492	.603	.260

TABLE 7

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Language Arts Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
1	.759	.802	.884
2	.859	.653	.713
3	.802	.569	.687
4	.818	.681	.534
5	.829	.709	.580
6	.724	.818	.361
7	.795	.768	.759
8	.796	.671	.637
9	.286	.631	.641
10	.787	.533	.532
11	.870	.533	.466
12	.777	.679	.847
13	.796	.760	.676
14	.784	.870	.917
15	.692	.830	.917
16	.836	.693	.921
17	.076	.792	.840
18	.377	.814	.786
19	.733	.784	.871
20	.798	.723	.659
21	.818	.840	.952
22	.805	.834	.963
23	.580	.739	.895
24	.279	.762	.923
25	.438	.725	.864
26	.414	.758	.867
27	.539	.721	.772
28	.732	.487	.630
29	.814	.657	.829
30	.777	.499	.418
31	.802	.557	.503
32	.295	.505	.781
33	.746	.455	.761
34	.674	.681	.790
35	.793	.615	.689
36	.744	.555	.530
37	.323	.539	.532
38	.429	.579	.449
39	.764	.425	.733
40	.528	.477	.578

TABLE 7 (cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Language Arts Subtests - Form B

Item Number	Proportion of Correct Responses Grade 3	Grade 6	Grade 8
41	.645	.553	.435
42	.369	.593	.442
43	.712	.663	.972
44	.555	.854	.648
45	.641	.872	.947
46	.499	.874	.853
47	.694	.832	.930
48	.692	.878	.858
49	.486	.834	.945
50	.532	.860	.746
51	.733	.816	.906
52	.679	.802	.888
53	.602	.826	.608
54	.706	.816	.665
55	.454	.816	.398
56	.667	.180	.604
57	.703	.772	.534
58	.551	.541	.928
59	.521	.513	.788
60	.485	.906	.724
61	.622	.902	.742
62	.715	.455	.589
63	.546	.709	.932
64	.674	.717	.906
65	.285	.411	.899
66	.623	.872	.910
67	.596	.858	.908
68	.928	.804	.228
69	.762	.387	.551
70	.894	.764	.302
71	.935	.693	.549
72	.886	.743	.753
73	.877	.721	.694
74	.831	.749	.492
75	.798	.703	.346
76	.863	.932	.289
77	.847	.912	.790
78	.816	.747	.477
79	.811	.842	.888
80	.919	.816	.543

TABLE 7 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Language Arts Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
81	.757	.770	.821
82	.879	.810	.799
83	.843	.663	.845
84	.798	.808	.818
85	.796	.553	.779
86	.686	.766	.775
87	.672	.774	.665
88	.690	.635	.689
89	.760	.419	.737
90	.721	.697	.709
91	.623	.703	.696
92	.580	.752	.628
93	.636	.689	.501
94	.546	.455	.532
95	.762	.541	.470
96	.488	.525	.442
97	.686	.633	.352
98	.393	.537	.457
99	.706	.339	.221
100	.677	.475	.328

TABLE 8

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Mathematics Subtests - Form A

Item Number	Proportion of Correct Responses Grade 3	Grade 6	Grade 8
1	.970	.853	.840
2	.830	.767	.838
3	.915	.688	.691
4	.872	.624	.719
5	.920	.490	.622
6	.927	.397	.579
7	.752	.883	.570
8	.757	.773	.408
9	.720	.822	.870
10	.752	.784	.769
11	.470	.586	.605
12	.649	.578	.860
13	.805	.807	.505
14	.693	.781	.473
15	.775	.803	.484
16	.773	.703	.402
17	.862	.671	.441
18	.858	.586	.775
19	.835	.681	.888
20	.832	.599	.749
21	.826	.448	.870
22	.754	.509	.860
23	.766	.405	.847
24	.739	.510	.782
25	.904	.355	.739
26	.913	.369	.525
27	.862	.346	.808
28	.876	.543	.721
29	.585	.422	.752
30	.585	.331	.873
31	.566	.412	.579
32	.466	.397	.391
33	.667	.308	.546
34	.629	.291	.307
35	.612	.323	.425
36	.619	.698	.352
37	.768	.594	.613
38	.821	.473	.222
39	.704	.505	.315
40	.810	.353	.184

TABLE 8 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Mathematics Subtests - Form A

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
41	.830	.363	.199
42	.709	.543	.503
43	.690	.414	.492
44	.413	.267	.276
45	.800	.416	.397
46	.794	.166	.173
47	.798	.244	.259
48	.720	.297	.242
49	.555	.206	.149
50	.824	.178	.801
51	.241	.561	.715
52	.613	.164	.650
53	.629	.181	.553
54	.754	.450	.486
55	.762	.537	.356
56	.665	.372	.292
57	.300	.548	.188
58	.488	.374	.309
59	.388	.325	.356
60	.488	.463	.298
61	.564	.231	.296
62	.644	.108	.339
63	.754	.117	.352
64	.592	.102	.328
65	.294	.588	.235
66	.300	.261	.376
67	.319	.293	.825
68	.381	.367	.806
69	.287	.142	.799
70	.489	.144	.879
71	.363	.176	.879
72	.449	.796	.406
73	.931	.565	.337
74	.764	.493	.374
75	.261	.679	.380
76	.605	.452	.741
77	.956	.280	.730
78	.926	.728	.711
79	.915	.361	.436
80	.926	.284	.469

TABLE 8 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Mathematics Subtests - Form A

Item Number	Proportion of Correct Responses Grade 3	Grade 6	Grade 8
81	.722	.244	.393
82	.869	.476	.451
83	.408	.405	.259
84	.670	.257	.626
85	.223	.250	.488
86	.516	.250	.359
87	.454	.217	.341
88	.637	.486	.296
89	.892	.420	.721
90	.899	.493	.726
91	.759	.420	.713
92	.612	.433	.806
93	.833	.193	.559
94	.576	.204	.505
95	.821	.164	.458
96	.812	.163	.490
97	.663	.518	.469
98	.401	.244	.564
99	.594	.200	.467
100	.589	.234	.348
101	.807		
102	.633		
103	.681		
104	.441		

TABLE 9

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Mathematics Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
1	.940	.932	.844
2	.917	.849	.829
3	.890	.726	.678
4	.910	.609	.663
5	.837	.495	.674
6	.807	.509	.482
7	.801	.911	.518
8	.848	.837	.542
9	.805	.703	.812
10	.443	.813	.847
11	.496	.671	.471
12	.578	.554	.840
13	.771	.820	.842
14	.770	.749	.566
15	.764	.686	.400
16	.775	.624	.499
17	.853	.648	.376
18	.809	.637	.741
19	.846	.654	.870
20	.800	.491	.313
21	.782	.482	.888
22	.855	.425	.849
23	.752	.393	.851
24	.759	.406	.758
25	.865	.369	.711
26	.881	.452	.629
27	.887	.304	.832
28	.911	.533	.862
29	.550	.382	.784
30	.550	.395	.562
31	.479	.172	.477
32	.544	.418	.752
33	.564	.352	.616
34	.566	.314	.380
35	.624	.471	.374
36	.631	.688	.263
37	.787	.522	.514
38	.816	.457	.400
39	.832	.550	.212
40	.817	.463	.613

TABLE 9 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests Mathematics Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
41	.466	.244	.592
42	.596	.403	.456
43	.397	.336	.365
44	.690	.268	.367
45	.812	.446	.311
46	.794	.418	.438
47	.773	.361	.238
48	.819	.251	.270
49	.824	.221	.194
50	.849	.166	.747
51	.837	.662	.756
52	.865	.180	.587
53	.656	.214	.531
54	.819	.482	.514
55	.635	.280	.397
56	.842	.444	.257
57	.351	.507	.207
58	.466	.231	.240
59	.672	.391	.348
60	.489	.293	.298
61	.489	.108	.371
62	.640	.157	.136
63	.780	.132	.205
64	.548	.263	.263
65	.383	.520	.341
66	.415	.338	.210
67	.369	.308	.823
68	.424	.420	.842
69	.355	.174	.737
70	.388	.433	.851
71	.206	.110	.836
72	.402	.796	.471
73	.819	.440	.456
74	.837	.329	.274
75	.926	.524	.328
76	.787	.501	.741
77	.956	.395	.629
78	.947	.624	.460
79	.890	.336	.419
80	.941	.297	.598

TABLE 9 (Cont.)

Item Difficulty by Item Number for the Minimum Skills Diagnostic Tests
Mathematics Subtests - Form B

Item Number	Proportion of Correct Responses		
	Grade 3	Grade 6	Grade 8
81	.452	.304	.428
82	.633	.478	.592
83	.707	.391	.572
84	.495	.221	.611
85	.404	.422	.462
86	.711	.280	.328
87	.686	.520	.374
88	.379	.431	.371
89	.617	.484	.667
90	.709	.503	.523
91	.613	.550	.661
92	.833	.446	.806
93	.826	.221	.609
94	.637	.206	.477
95	.727	.136	.518
96	.415	.138	.555
97	.725	.420	.393
98	.449	.282	.404
99	.713	.238	.389
100	.312	.151	.242

TEST NORMS

Students who correctly answer all of the items on the Reading, Language Arts, or Mathematics subtests of the MSDT could be assumed to be students that do not need remedial instruction in the basic competency skills. If everyone answered all of the items correctly, however, a different interpretation would be placed on the scores. At some point, scores must have a reference grounded in the experience of all students. In some respects, at least, everything is good or bad by comparison. Norms tables provide that reference. Given a norms table, a student's score can be compared with other students' scores.

Norms tables commonly have two points of reference: a scale of percentiles and a scale of standard scores. The former permits the location of a score within percentile ranks; thus a student is said to have exceeded the performance of 80% of the students in the norm group (in this case third, sixth, or eighth grade students taking the Minimum Skills Diagnostic Tests in May 1986). The latter, standard scores, permits the location of a score within normally-distributed standard scores. This reference is appropriate if the student abilities are believed to be normally distributed. In a normal distribution, raw scores are given greater and greater weight as they diverge from the mean in either direction.

The choice of a metric for the standard score is arbitrary. To avoid inappropriate and confusing comparisons with some of the more common metrics, such as those employed in IQ scores or NCE scores, a metric having a mean of 50 and a standard deviation of 10 was chosen. Most curriculum research studies involving the summation of scores will find the standard score to be the basic statistic of choice.

The norms for student scores on the Minimum Skills Diagnostic Tests are given in Table 10 for the Reading subtests, Table 11 for the Language Arts subtests, and Table 12 for the Mathematics subtests. These scores set a baseline for comparison for present and future achievement in Reading, Language Arts, and Mathematics. Thus a student score in 1986, 1987, and future years can be referenced to the scores of all 1986 third, sixth, and eighth graders who took the MSDT in North Carolina.

Table 10

Norms for Student Scores on the Minimum Skills Diagnostic Tests
Reading Subtests

Raw Score	Grade 3 Percentile	Grade 3 Std Score[a]	Grade 6 Percentile	Grade 6 Std Score[a]	Grade 8 Percentile	Grade 8 Std Score[a]
96	99	65.6	-	-	-	-
95	99	65.2	-	-	-	-
94	99	64.7	-	-	-	-
93	98	64.3	-	-	-	-
92	97	63.9	-	-	-	-
91	97	63.4	-	-	-	-
90	95	63.0	-	-	99	74.7
89	94	62.6	99	70.3	99	74.0
88	93	62.1	99	69.6	99	73.4
87	93	61.7	99	69.0	99	72.7
86	89	61.3	99	68.4	99	72.1
85	86	60.8	99	67.7	99	71.4
84	84	60.4	99	67.1	98	70.8
83	83	60.0	98	66.5	98	70.1
82	80	59.5	97	65.8	98	69.5
81	78	59.1	97	65.2	98	68.8
80	75	58.7	95	64.6	97	68.2
79	74	58.2	93	64.0	97	67.5
78	71	57.8	92	63.3	97	66.9
77	69	57.3	91	62.7	96	66.2
76	68	56.9	89	62.1	96	65.6
75	66	56.5	88	61.4	95	64.9
74	65	56.0	86	60.8	94	64.3
73	63	55.6	84	60.2	93	63.6
72	60	55.2	83	59.6	91	63.0
71	59	54.7	81	58.9	89	62.3
70	57	54.3	79	58.3	88	61.7
69	54	53.9	77	57.7	86	61.0
68	52	53.4	75	57.0	85	60.4
67	50	53.0	72	56.4	83	59.7
66	49	52.6	69	55.8	82	59.1
65	48	52.1	67	55.2	79	58.4
64	46	51.7	64	54.5	77	57.8
63	45	51.3	62	53.9	75	57.1
62	44	50.8	59	53.3	73	56.5
61	43	50.4	57	52.6	71	55.8
60	42	50.0	54	52.0	69	55.2
59	42	49.5	51	51.4	66	54.5
58	41	49.1	47	50.8	63	53.9
57	40	48.7	44	50.1	61	53.2

[a]Adjusted to a mean of 50 and a standard deviation of 10.0.

Table 10 (cont.)

Norms for Student Scores on the Minimum Skills Diagnostic Tests
Reading Subtests

Raw Score	Grade 3 Percentile	Grade 3 Std Score[a]	Grade 6 Percentile	Grade 6 Std Score[a]	Grade 8 Percentile	Grade 8 Std Score[a]
56	39	48.2	42	49.5	57	52.6
55	38	47.8	40	48.9	55	51.9
54	38	47.3	39	48.2	53	51.3
53	37	46.9	38	47.6	51	50.6
52	36	46.5	36	47.0	49	50.0
51	36	46.0	34	46.4	46	49.4
50	35	45.6	32	45.7	43	48.7
49	34	45.2	30	45.1	40	48.1
48	33	44.7	29	44.5	38	47.4
47	31	44.3	28	43.8	37	46.8
46	30	43.9	25	43.2	35	46.1
45	29	43.4	24	42.6	33	45.5
44	29	43.0	22	41.9	31	44.8
43	29	42.6	21	41.3	30	44.2
42	27	42.1	19	40.7	28	43.5
41	25	41.7	17	40.1	26	42.9
40	24	41.3	15	39.4	23	42.2
39	23	40.8	14	38.8	22	41.6
38	21	40.4	12	38.2	21	40.9
37	20	40.0	11	37.5	18	40.3
36	20	39.5	10	36.9	17	39.6
35	18	39.1	9	36.3	16	39.0
34	18	38.7	9	35.7	14	38.3
33	17	38.2	9	35.0	11	37.7
32	16	37.8	7	34.4	10	37.0
31	15	37.3	7	33.8	9	36.4
30	14	36.9	5	33.1	8	35.7
29	13	36.5	5	32.5	7	35.1
28	11	36.0	4	31.9	6	34.4
27	11	35.6	4	31.3	5	33.8
26	10	35.2	4	30.6	5	33.1
25	9	34.7	3	30.0	3	32.5
24	7	34.3	3	29.4	3	31.8
23	6	33.9	3	28.7	1	31.2
22	4	33.4	2	28.1	1	30.5
21	3	33.0	1	27.5	1	29.9
20	3	32.6	1	26.9	1	29.2
19	2	32.1	1	26.2	1	28.6
Less than 19	1		1		1	

[a]Adjusted to a mean of 50 and a standard deviation of 10.0.

Table 11

Norms for Student Scores on the Minimum Skills Diagnostic Tests
Language Arts Subtests

Raw Score	Grade 3 Percentile	Grade 3 Std Score[a]	Grade 6 Percentile	Grade 6 Std Score[a]	Grade 8 Percentile	Grade 8 Std Score[a]
98	99	66.0	99	66.6	-	-
97	99	65.5	99	66.0	-	-
96	99	64.9	99	65.4	-	-
95	99	64.4	99	64.9	-	-
94	98	63.9	99	64.3	99	68.7
93	97	63.4	99	63.7	99	67.9
92	95	62.9	99	63.1	99	67.2
91	93	62.4	98	62.5	99	66.4
90	91	61.9	96	61.9	99	65.7
89	89	61.3	94	61.3	99	65.0
88	87	60.8	92	60.8	98	64.2
87	86	60.3	89	60.2	96	63.5
86	85	59.8	87	59.6	94	62.7
85	83	59.3	83	59.0	92	62.0
84	81	58.8	81	58.4	91	61.3
83	78	58.2	78	57.8	89	60.5
82	75	57.7	76	57.3	86	59.8
81	72	57.2	72	56.7	84	59.0
80	71	56.7	70	56.1	81	58.3
79	69	56.2	65	55.5	78	57.6
78	67	55.7	61	54.9	76	56.8
77	64	55.2	57	54.3	73	56.1
76	63	54.6	54	53.7	68	55.3
75	61	54.1	51	53.2	64	54.6
74	61	53.6	49	52.6	62	53.9
73	58	53.1	47	52.0	58	53.1
72	56	52.6	45	51.4	54	52.4
71	54	52.1	42	50.8	51	51.6
70	51	51.5	39	50.2	48	50.9
69	48	51.0	38	49.6	45	50.1
68	45	50.5	36	49.1	41	49.4
67	43	50.0	35	48.5	38	48.7
66	41	49.5	34	47.9	34	47.9
65	38	49.0	32	47.3	30	47.2
64	37	48.5	31	46.7	28	46.4
63	36	47.9	30	46.1	27	45.7
62	35	47.4	28	45.6	25	45.0
61	33	46.9	27	45.0	23	44.2
60	30	46.4	26	44.4	21	43.5
59	29	45.9	24	43.8	20	42.7

[a]Adjusted to a mean of 50 and a standard deviation of 10.0.

Table 11 (cont.)

Norms for Student Scores on the Minimum Skills Diagnostic Tests
Language Arts Subtests

Raw Score	Grade 3 Percentile	Grade 3 Std Score[a]	Grade 6 Percentile	Grade 6 Std Score[a]	Grade 8 Percentile	Grade 8 Std Score[a]
58	28	45.4	23	43.2	17	42.0
57	26	44.8	21	42.6	17	41.3
56	25	44.3	20	42.0	14	40.5
55	23	43.8	19	41.5	13	39.8
54	22	43.3	18	40.9	11	39.0
53	21	42.8	17	40.3	11	38.3
52	20	42.3	15	39.7	9	37.6
51	19	41.8	14	39.1	8	36.8
50	18	41.2	13	38.5	7	36.1
49	18	40.7	13	38.0	7	35.3
48	16	40.2	12	37.4	6	34.6
47	16	39.7	12	36.8	5	33.9
46	15	39.2	12	36.2	5	33.1
45	15	38.7	12	35.6	4	32.4
44	14	38.1	10	35.0	4	31.6
43	14	37.6	8	34.4	4	30.9
42	13	37.1	8	33.9	3	30.1
41	13	36.6	8	33.3	3	29.4
40	12	36.1	7	32.7	3	28.7
39	11	35.6	7	32.1	3	27.9
38	10	35.1	7	31.5	2	27.2
37	9	34.5	6	30.9	2	26.4
36	8	34.0	5	30.4	2	25.7
35	8	33.5	5	29.8	2	25.0
34	7	33.0	4	29.2	2	24.2
33	6	32.5	4	28.6	1	23.5
32	5	32.0	4	28.0	1	22.7
31	4	31.4	3	27.4	1	22.0
30	4	30.9	3	26.8	1	21.3
29	4	30.4	2	26.3	1	20.5
28	3	29.9	2	25.7	1	19.8
27	3	29.4	2	25.1	1	19.0
26	2	28.9	1	24.5	1	18.3
25	2	28.4	1	23.9	1	17.6
24	2	27.8	1	23.3	1	16.8
23	2	27.3	1	22.7	1	16.1
Less than 23	1		1		1	

[a]Adjusted to a mean of 50 and a standard deviation of 10.0.

Table 12

Norms for Student Scores on the Minimum Skills Diagnostic Tests
Mathematics Subtests

Raw Score	Grade 3 Percentile	Grade 3 Std Score[a]	Grade 6 Percentile	Grade 6 Std Score[a]	Grade 8 Percentile	Grade 8 Std Score[a]
98	99	68.8	-	-	-	-
97	99	68.2	-	-	-	-
96	99	67.5	-	-	-	-
95	99	66.9	-	-	-	-
94	99	66.3	-	-	-	-
93	99	65.7	-	-	-	-
92	99	65.1	-	-	-	-
91	98	64.5	-	-	-	-
90	97	63.9	-	-	-	-
89	96	63.3	-	-	99	77.3
88	94	62.6	-	-	99	76.6
87	92	62.0	-	-	99	75.8
86	91	61.4	-	-	99	75.0
85	88	60.8	99	81.6	99	74.3
84	87	60.2	99	80.8	99	73.5
83	85	59.6	99	80.1	99	72.7
82	82	59.0	99	79.3	99	72.0
81	80	58.3	99	78.6	99	71.2
80	78	57.7	99	77.8	99	70.5
79	75	57.1	99	77.1	99	69.7
78	72	56.5	99	76.3	99	68.9
77	69	55.9	99	75.6	98	68.2
76	66	55.3	99	74.8	97	67.4
75	63	54.7	99	74.1	96	66.6
74	62	54.0	99	73.3	96	65.9
73	59	53.4	99	72.6	95	65.1
72	57	52.8	99	71.8	93	64.4
71	55	52.2	98	71.1	92	63.6
70	52	51.6	98	70.3	90	62.8
69	49	51.0	97	69.5	88	62.1
68	46	50.4	96	68.8	86	61.3
67	44	49.8	96	68.0	86	60.5
66	42	49.1	96	67.3	84	59.8
65	39	48.5	95	66.5	80	59.0
64	36	47.9	94	65.8	78	58.2
63	35	47.3	93	65.0	75	57.5
62	32	46.7	93	64.3	73	56.7
61	30	46.1	91	63.5	71	56.0
60	28	45.5	90	62.8	69	55.2
59	26	44.8	88	62.0	67	54.4
58	24	44.2	87	61.3	63	53.7

[a]Adjusted to a mean of 50 and a standard deviation of 10.0.

Table 12 (cont.)

Norms for Student Scores on the Minimum Skills Diagnostic Tests
Mathematics Subtests

Raw Score	Grade 3 Percentile	Grade 3 Std Score[a]	Grade 6 Percentile	Grade 6 Std Score[a]	Grade 8 Percentile	Grade 8 Std Score[a]
57	22	43.6	85	60.5	61	52.9
56	20	43.0	83	59.8	57	52.1
55	18	42.4	81	59.0	55	51.4
54	17	41.8	79	58.3	53	50.6
53	16	41.2	77	57.5	50	49.8
52	14	40.6	74	56.8	47	49.1
51	13	39.9	71	56.0	45	48.3
50	12	39.3	70	55.3	42	47.6
49	11	38.7	68	54.5	39	46.8
48	10	38.1	65	53.8	36	46.0
47	10	37.5	62	53.0	33	45.3
46	9	36.9	60	52.3	30	44.5
45	8	36.3	57	51.5	29	43.7
44	7	35.6	54	50.8	25	43.0
43	7	35.0	52	50.0	22	42.2
42	6	34.4	49	49.2	20	41.5
41	6	33.8	47	48.5	18	40.7
40	5	33.2	44	47.7	16	39.9
39	4	32.6	41	47.0	14	39.2
38	4	32.0	37	46.2	12	38.4
37	3	31.3	34	45.5	11	37.6
36	3	30.7	32	44.7	10	36.9
35	2	30.1	29	44.0	9	36.1
34	2	29.5	27	43.2	7	35.3
33	2	28.9	24	42.5	6	34.6
32	2	28.3	21	41.7	6	33.8
31	2	27.7	18	41.0	5	33.1
30	1	27.1	17	40.2	4	32.3
29	1	26.4	15	39.5	3	31.5
28	1	25.8	13	38.7	2	30.8
27	1	25.2	10	38.0	1	30.0
26	1	24.6	9	37.2	1	29.2
25	1	24.0	7	36.5	1	28.5
24	1	23.4	6	35.7	1	27.7
23	1	22.8	4	35.0	1	26.9
22	1	22.1	3	34.2	1	26.2
21	1	21.5	3	33.5	1	25.4
20	1	20.9	2	32.7	1	24.7
19	1	20.3	2	32.0	1	23.9
18	1	19.7	2	31.2	1	23.1
Less than 18	1		1		1	

[a]Adjusted to a mean of 50 and a standard deviation of 10.0.

APPENDICES

APPENDIX A

MINIMUM SKILLS DIAGNOSTIC TESTS - GRADE 3

Test Content and Item Representation by Objective

Objective	Description	No. Items Form A	No. Items Form B
Reading			
1.	Read a passage with a reading level of 3.1 and demonstrate comprehension of the main idea by selecting the best title for the passage.	15	13
2.	Read a passage with a reading level of 3.1 and identify details stated in the passage.	17	15
3.	Read a passage with a reading level of 3.1 and demonstrate comprehension of sequence by identifying the event that happens first or last in the passage.	15	17
4.	Read a passage with a reading level of 3.1 and understand the story setting by identifying where the story took place.	17	11
5.	Read a passage with a reading level of 3.1 and predict the most probable outcome of an event in the passage.	12	15
6.	Read a passage with a reading level of 3.1 and identify either the cause or the effect of an explicitly stated cause/effect relationship occurring in the passage.	14	14
7.	Read a passage with a reading level of 3.1 and select either a synonym, antonym, homonym, or a multiple meaning word for an underlined word in the passage.	10	15

Objective	Description	No. Items Form A	Form B
Language			
1.	Given a sentence, select the part of the sentence with a mistake in capitalization.		
a.	Pronoun I	7	7
b.	First Word	8	8
c.	Names and Places	4	4
d.	Days and Months	10	10
e.	Words not to be capitalized	10	10
2.	Given a sentence, select the correct way to punctuate it.		
a.	Comma	3	3
b.	Question mark	7	7
c.	Period	7	7
d.	Exclamation Point	6	6
e.	Comma and Period	2	2
f.	No punctuation needed	3	3
3.	Given an incomplete sentence, the student will select the correctly spelled word to complete the sentence.	33	33
Mathematics			
1.	Add three 1-digit numbers.	4	4
2.	Compare two numbers less than 100 without using symbolic notation.	4	4
3.	Order numbers less than 1000.	4	4
4.	Add two 2-digit numbers, regrouping ones.	4	4
5.	Add a 1-digit number to a 2-digit number, regrouping ones.	4	4
6.	Add three 2-digit numbers, regrouping ones.	4	4
7.	Add two 3-digit numbers with no regrouping.	4	4

Objective	Description	No. Items Form A	Form B
8.	Subtract two 2-digit numbers, regrouping tens.	4	4
9.	Subtract a 1-digit number from a 2-digit number, regrouping tens.	4	4
10.	Subtract two 3-digit numbers with no regrouping.	4	4
11.	Use addition or subtraction to solve word problems appropriate to computational level.	4	4
12.	Write the value of one dollar, dimes, and pennies.	4	4
13.	Write the standard form for hundreds, tens, and ones.	4	4
14.	Use repeated addition to develop multiplication facts in multiples of 2, 3, 5, and 10.	4	4
15.	Multiply two 1-digit numbers, using facts through 25.	4	4
16.	Use arrays to develop division facts through 25.	4	4
17.	Use 1-digit numbers as factors and divisors, using facts through 25.	4	4
18.	Use multiplication (facts through 25) to solve word problems appropriate to computational level.	4	4
19.	Tell time to the nearest quarter hour.	4	4
20.	Measure length to the nearest centimeter and inch.	4	4
21.	Identify fractional parts of a region (1/2, 1/3, 1/4).	4	4
22.	Identify cubes, cylinders, and spheres.	4	4
23.	Identify circles, triangles, squares, and rectangles.	4	4
24.	Recognize ordinal numbers to tenths.	4	4
25.	Extend sequence of given pattern.	4	4
26.	Read and interpret bar and picture graphs.	4	4

APPENDIX B

MINIMUM SKILLS DIAGNOSTIC TESTS - GRADE 6

Test Content and Item Representation by Objective

Objective	Description	No. Items Form A	Form B
Reading			
1.	Recognize synonyms and multiple meanings for words.	10	10
2.	Identify root words and affixes.	10	10
3.	Recognize word categories.	10	10
4.	Read a passage with a reading level of 5.0 and identify a detail stated in the passage.	14	11
5.	Read a passage with a reading level of 5.0 and identify the main idea.	11	12
6.	Read a passage with a reading level of 5.0 and identify the setting within the passage.	7	6
7.	Read a passage with a reading level of 5.0 and select the correct sequence of events in the passage.	10	11
8.	Read a passage with a reading level of 5.0 and identify either the cause or effect of a relationship within the passage.	9	10
9.	Read a passage with a reading level of 5.0 and select the best conclusion for the passage.	10	8
10.	Read a passage with a reading level of 5.0 and identify the characters' traits, attitudes, and actions.	9	12
Language			
1.	Identify a group of words as a sentence.	6	6
2.	Identify the correct spelling of words.	25	25

Objective	Description	No. Items Form A	Form B
3.	Identify the correct plurals of nouns and verbs.	7	7
4.	Select forms of verbs to agree with subjects.	7	7
5.	Choose the correct pronoun to represent a given noun.	7	7
6.	Choose the correct punctuation for a short paragraph.	15	15
7.	Capitalize correctly:		
	a. The pronoun "I" and first words in sentences	9	9
	b. Names of persons and places, days of the week, and months of the year	8	8
	c. Words not to be capitalized.	4	4
8.	Identify correct abbreviations.	6	6
9.	Locate information in directories and reference materials.	6	6
Mathematics			
1.	Write the standard form of a number up to millions.	3	3
2.	Compare numbers to millions.	3	3
3.	Add two 4- or 5-digit numbers with regrouping.	3	3
4.	Subtract two 4- or 5-digit numbers with regrouping.	3	3
5.	Multiply a 2-digit number or a 3-digit number by a 1-digit number with regrouping.	3	3
6.	Multiply a 3-digit number or a 2-digit number by a 2-digit number.	4	4
7.	Divide a 3- or 4-digit number by a 1-digit number with a zero in the quotient.	4	4
8.	Divide a 3- or 4-digit number by a 2-digit number.	4	4

Objective	Description	No. Items Form A	Form B
9.	Use an estimate to check the reasonableness of a given sum, difference, product, or quotient.	4	4
10.	Write decimals to thousandths.	4	4
11.	Add decimals to thousandths.	3	3
12.	Subtract decimals to thousandths.	3	3
13.	Write decimals greater than 1 using tenths and hundredths.	3	3
14.	Find the least common multiple of two numbers.	3	3
15.	Find the greatest common factor of two numbers.	4	4
16.	Write the simplest form for a fraction.	3	3
17.	Write a fraction or mixed number with a denominator of 10 or 100 as a decimal and a decimal as a fraction.	3	3
18.	Multiply two unit fractions or a fraction by a whole number.	3	3
19.	Multiply a mixed number by a fraction or a whole number.	4	4
20.	Multiply a decimal and a whole number or 2 decimals in tenths.	3	3
21.	Add fractions.	4	4
22.	Read and interpret bar, line, circle, and picture graphs.	3	3
23.	Add, subtract, multiply, and divide to solve word problems appropriate to computational level.	4	4
24.	Determine appropriate metric unit using centimeter, meter, or kilometer.	3	3
25.	Solve word problems involving money.	5	3

Objective	Description	No. Items Form A	Form B
26.	Solve problems involving perimeter and area when a formula is given.	2	4
27.	Compare decimals.	4	4
28.	Find the average of a group of numbers.	4	4
29.	Identify angles, parallel lines, and perpendicular lines.	4	4

APPENDIX C

MINIMUM SKILLS DIAGNOSTIC TESTS - GRADE 8

Test Content and Item Representation by Objective

Objective	Description	No. Items Form A	No. Items Form B
Reading			
1.	Recognize synonyms and multiple meanings for words.	10	10
2.	Identify word meanings using context clues and identify root words and affixes.	10	10
3.	Recognize word categories.	10	10
4.	Read a passage with a reading level of 6.6 and identify a detail stated in the passage.	12	14
5.	Read a passage with a reading level of 6.6 and identify the main idea.	10	11
6.	Read a passage with a reading level of 6.6 and identify what is implied but not directly stated in the passage.	10	11
7.	Read a passage with a reading level of 6.6 and select the correct sequence of events in the passage.	10	10
8.	Read a passage with a reading level of 6.6 and select either the implied similarities or differences between characters, objects, or events in the passage.	8	6
9.	Read a passage with a reading level of 6.6 and select the best conclusion for the passage.	13	10
10.	Read a passage with a reading level of 6.6 and identify a statement about the passage as either fact or opinion.	7	8

Objective	Description	No. Items Form A	Form B
Language			
1.	Identify a group of words as a sentence.	6	6
2.	Identify the correct spelling of words.	24	24
3.	Identify the correct plurals of nouns and verbs.	7	7
4.	Select forms of verbs to agree with subject.	7	7
5.	Choose the correct pronoun to represent a given noun.	7	7
6.	Choose the correct punctuation for a short paragraph.	15	15
7.	Capitalize correctly:		
	a. The pronoun "I" and first words in sentences	4	4
	b. Names of persons and places, days of the week, and months of the year	6	6
	c. No capitalization needed.	5	5
8.	Identify correct abbreviations.	6	6
9.	Locate information in directories and reference materials.	7	7
10.	Arrange sentences in the best logical order to form a coherent paragraph.	6	6
Mathematics			
1.	Write the standard form for numbers up to 12 digits.	4	4
2.	Round whole numbers to a designated place.	4	4
3.	Compare numbers to millions.	5	5
4.	Round a decimal to a designated place.	4	4
5.	Compare decimals and fractions.	5	5
6.	Add, subtract, multiply, and divide whole numbers.	5	5

Objective	Description	No. Items Form A	Form B
7.	Add, subtract, multiply, and divide decimals.	5	5
8.	Add, subtract, and multiply fractions.	4	4
9.	Write a fraction or mixed number with a denominator of 10, 100, or 1000 as a decimal and a decimal as a fraction.	5	5
10.	Multiply or divide a decimal by a power of 10.	4	4
11.	Divide two decimals, rounding quotient to the nearest tenth or hundredth.	4	4
12.	Estimate the sum, difference, product, or quotient of two whole numbers.	4	4
13.	Write fraction, decimal, and percent equivalents.	4	4
14.	Find a percent of a number.	4	4
15.	Find what percent one number is of another number.	5	5
16.	Find the perimeter of a polygon.	5	5
17.	Find the circumference of a circle when given the formula $C = \pi d$ and the value for π.	4	4
18.	Find the least common multiple (LCM) of two numbers.	4	4
19.	Find the greatest common factor (GCF) of two numbers.	5	5
20.	Determine appropriate metric units for length using centimeters, meters, or kilometers.	4	4
21.	Determine appropriate customary units for length using inches, yards, or miles.	4	4
22.	Write decimals greater than 1 using tenths and hundredths.	4	4
23.	Write decimals to thousandths.	4	4

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